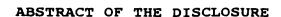
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A semiconductor substrate, on which a silicon dioxide film with a resist film defined thereon has been formed, is placed inside a reaction chamber of a plasma processing system. Then, a fluorocarbon gas with a C/F ratio of 0.5 or more is introduced into the reaction chamber. In this process step, the flow rate of the gas is controlled such that the residence time au of the gas in the reaction chamber becomes greater than 0.1 sec and equal to or less than 1 sec in accordance with an equation $\tau = P \times V / Q$, where τ is the residence time (unit: sec), P is a pressure (unit: Pa) of the gas, V is a volume (unit: L) of the reaction chamber and Q is the flow rate (unit: Pa · L/sec) of the gas. Thereafter, plasma is created from the fluorocarbon gas and the silicon dioxide film is plasma-etched using the resist film as a mask.